ered to be at fault for the job separation." *See Associated Press*, February 10, 1994.

WORKPLACE: WORKERS' COMPENSATION

[19] *Employer: County of Westchester*, 1994 WL 159498 (New York Workers' Compensation Board) (decided April 19, 1994)

Affirming a law judge's decision, the New York Workers' Compensation Board has denied the claim of a social service examiner who alleged that workplace ETS exposure aggravated her asthma and caused her to develop stress, dizziness, nausea and anxiety. The board panel reviewing the case stated the following conclusions:

- The claimant failed to submit prima facie medical evidence of an accident arising from the course of her employment;
- The claimant's exposure to ETS was not due to the nature of her employment and thus could not result in an occupational disease within the meaning of the Workers' Compensation Law; and
- The medical evidence produced did not constitute a causal relationship.

LEGAL ISSUES AND DEVELOPMENTS

[20] St. Louis Bar Association Schedules Seminar on Smoking in the Workplace

Antismoking activist Richard Daynard is expected to be among the speakers at a half-day seminar for lawyers about smoking in the workplace, scheduled for June 16, 1994, in St. Louis, Missouri. According to a seminar brochure, Daynard's topic will be: "The Impact of the Environmental Protection Agency Report and the Americans with Disabilities Act on Second-Hand Smoke Issues in the Workplace."

The two other featured speakers are (i) Lisa Van Amburg, a St. Louis attorney, who will discuss "Legal Trends in Second-Hand Smoke Issues in the U.S. Workplace," and (ii) Robert Schwartz, a professor of law at the University of New Mexico, who will address two topics -- "Should Smokers be Required to Pay the Health Care Costs of Their Habit?" and "Second-Hand Smoke Litigation in Australia."

The seminar is being co-sponsored by The Bar Association of Metropolitan St. Louis, the Saint Louis University School of Law, and St. Louis ASSIST (American Stop Smoking Intervention Study).

OTHER DEVELOPMENTS

[21] Survey Shows Economic Impact of Smoking Bans on Restaurants

Results of a recent survey reportedly indicate that some restaurant owners say smoking bans have resulted in lost revenues of up to $23,336 per month. The survey results were released at the National Restaurant Association's annual convention held in Chicago on May 16 and 17, 1994. According to the reported results, 32 percent of those questioned said they had noticed a negative impact on business; 75 percent of those said they had been forced to lay off employees. Fourteen percent said their revenues had increased, but by less than $4,000 per month. A spokesperson interviewed in a media report said, "The large dollar figure, $23,336, is scary in that so many restaurants are operating on the edge." The spokesperson also said that smoking bans have cost some cities convention business, noting, "We've seen that in California where they lost major conventions for that reason." Some of the 800 restaurateurs surveyed said they've noticed an increase in customer complaints, a loss in regular customers and a decrease in reservations. The survey was conducted the week of April 14 by the Charlton Research Co. of San Francisco and included restaurant owners in California, Colorado, Massachusetts and Texas. *See United Press International*, May 16, 1994.

[22] American Airlines Shareholders Defeat Smoking Ban Proposal

Shareholders of AMR Corp overwhelmingly defeated a proposal by a Texas shareholder to ban smoking on American Airlines international flights, according to reported comments by an airline spokesman. He noted that the proposal was supported by only six percent of the 50 million votes cast. Company officials responded to questions about the proposal by pointing out that

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the 50 million votes cast. Company officials responded to questions about the proposal by pointing out that such a move would put the airline at a tremendous disadvantage in the competitive international market. *See United Press International*, May 18, 1994.

SCIENTIFIC/TECHNICAL ITEMS

LUNG CANCER

[23] "Childhood and Adolescent Passive Smoking and the Risk of Female Lung Cancer," F.-L. Wang, E.J. Love, N. Liu, and X.-D. Dai, *International Journal of Epidemiology* 23(2): 223-230, 1994 [See Appendix A]

The majority of the data presented in this study are drawn from a sample that includes current smokers, former smokers and neversmokers. Thus, the data are, for the most part, not directly comparable to data in the spousal smoking studies, which focus on nonsmokers. Nevertheless, in one analysis, the authors report statistically significantly elevated risk estimates for adult lung cancer in neversmoking women who reported ETS exposure before the age of six, and between the ages of seven and 14.

RESPIRATORY DISEASES AND CONDITIONS - CHILDREN

[24] "Prevalence of Asthma and Wheeze in Two Different Climatic Areas of Saudi Arabia," A. Bener, T.Q. Al-Jawadi, F. Ozkaragoz, and J.A.D. Anderson, *Indian Journal of Chest Disease and Allied Sciences* 35(1): 9-15, 1993 [See Appendix A]

The authors report differences in the prevalence of symptoms associated with asthma between children living in a humid region of Saudi Arabia, versus a dry region. They also report that paternal smoking was more common among "wheezy" children.

[25] "Home Environmental Risk Factors in Urban Minority Asthmatic Children," K. Huss, C.S. Rand, A.M. Butz, P.A. Eggleston, C. Murigande, L.C. Thompson, S. Schneider, K. Weeks, and F.J. Malveaux, *Annals of Allergy* 72: 173-177, 1994 [See Appendix A]

In this study, cigarette smoking is reported to be a "trigger" of asthma attacks by 72 percent of respondents; however, the authors report no association between parental smoking and the severity of asthma.

ETS EXPOSURE AND MONITORING

[26] "Decreased Fetal Weights in Rats Exposed to Sidestream Cigarette Smoke," P. Rajini, J.A. Last, K.E. Pinkerton, A.G. Hendrickx, and H. Witschi, *Fundamental and Applied Toxicology* 22: 400-404, 1994 [See Appendix A]

In this study, pregnant female rats were exposed to sidestream smoke in a whole-body exposure chamber. The authors report that the weight of the offspring showed a "small but significant reduction."

[27] "Short-Term Effects of Sidestream Smoke on Respiratory Epithelium in Mice: Cell Kinetics," P. Rajini and H. Witschi, *Fundamental and Applied Toxicology* 22: 405-410, 1994 [See Appendix A]

The authors of this study report increased respiratory tract cell proliferation in one of two strains of mouse studied, and only at an "'extreme'" concentration of sidestream smoke.

INDOOR AIR QUALITY

[28] Study Estimates Productivity Gains from IAQ Improvements at $54.5 Billion

A new study published by the National Energy Management Institute (NEMI) concludes that improving IAQ in all nonindustrial commercial buildings in the United States "could result in an annual productivity gain of $54.5 billion and could pay back the cost of making improvements in less than two years," according to an IAQ journal. The journal reports that the study is "the first project of this scope to both characterize the nation's building stock and calculate the cost-benefit of IAQ improvements."

The study reportedly recommends that all existing buildings be modified to meet two current ASHRAE standards: 62-1989, "Ventilation for Acceptable Indoor Air Quality," and 55-1992, "Thermal Environ-

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[29] **"Nitrogen Dioxide Exposures Inside Ice Skating Rinks," M. Bruner and J.D. Spengler, *American Journal of Public Health* 84(3): 429-433, 1994 [See Appendix A]**

In this paper, the authors report that measurements of nitrogen dioxide in ice skating rinks far exceed outdoor levels and may result in exposures in excess of those attributed to gas stoves, thought to be a major source of exposure.

[30] **"Air Recirculation and Sick Building Syndrome: A Blinded Crossover Trial," J.J.K. Jaakkola, P. Tuomaala, and O. Seppanen, *American Journal of Public Health* 84(3): 422-428, 1994 [See Appendix A]**

The authors of this study, conducted in Finland, report that study participants' ratings of symptoms (mucosal irritation, skin reaction, allergic reactions, and general symptoms) and perceptions of unpleasant odor, stuffiness, or dustiness did not differ between conditions of no recirculation and 70 percent recirculated air ventilation.

[31] **"Editorial: Building Ventilation and Symptoms -- Where Do We Go from Here?" M.J. Mendell and L. Fine, *American Journal of Public Health* 84(3): 346-348, 1994 [See Appendix A]**

The authors of this paper, which references the Jaakkola, et al., study on recirculation, are with the Cincinnati branch of NIOSH. They briefly review published data on ventilation and sick building symptom reports, and suggest that minimum ventilation requirements may not be enough to "guarantee" IAQ. They mention a more comprehensive approach, including proper design, maintenance, and construction of buildings and their systems.

[32] **"Tobacco Smoking Policy and Indoor Air Quality: A Case Study," M.A. Jadud and B.A. Rock, *Energy and Buildings* 20: 143-150, 1993 [See Appendix A]**

These researchers report on potential technical improvements and administrative actions suggested for a smoking area in an institutional building.

SMOKING POLICIES AND RELATED ISSUES

[33] **"Stratification and Smoking: A Search for Class-Based Smoking Lifestyles," J. Goldstein, *Journal of Drug Education* 23(4): 357-373, 1993 [See Appendix A]**

Based on a survey of residents of a Canadian city, the author reports few differences among social classes in smoking behaviors, including perceptions of the claimed adverse effects of ETS exposure and smoking prohibitions in residences.

IN EUROPE & AROUND THE WORLD

REGULATORY AND LEGISLATIVE MATTERS

CANADA

[34] **Government Considers Delaying Smoking Ban on International Flights**

The government ban on smoking on all of Canada's international flights that was scheduled to go into effect on July 1, 1994, may be delayed, according to a recent press report. The press report indicates that the government has come under pressure from air carriers who fear losing business, particularly on their lucrative routes to the Pacific Rim. The smoking ban had already been extended by a year after Canadian Airlines International said it stood to lose between $29 and $39 million in revenues if smoking were banned on its flights to Japan. An Air Canada spokesperson reportedly said, "The government decision is coming soon, and we would like to see some flexibility to allow us to offer smoking on those particular flights. We want to minimize the risk of revenue loss to foreign carriers."

The International Civil Aeronautics Organization (ICAO), representing 183 member states, passed a resolution last year calling for a total smoking ban on all international flights by July 1, 1996. Although Canada appeared to be spearheading the issue, a spokesperson from the Air Transport Association of Canada, the airlines' trade association, said that

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Canada's strategy of taking the lead on smoking bans has backfired on the country's airlines, stating "If the Canadian carriers don't allow smoking, if the passengers are left no choice, they'll simply book on other airlines."

ICAO apparently conducted a survey last year that revealed a variety of consequences of smoking bans. According to the reported results, which ICAO did not publish, problems attributed to smoking bans include: (i) fires in washrooms, (ii) damaged smoke detectors, and (iii) belligerent, insulting and sometimes dangerous passengers "suffering nicotine withdrawal." *See The Gazette (Montreal)*, May 21, 1994.

INDONESIA

[35] Smoking Ban on Buses to Be Enforced

A regulation prohibiting smoking on public buses that was published six years ago but has been ignored will be enforced, according to news reports of an announcement by Indonesia's Land Transportation Director. The directorate will also encourage people to ask smokers to stop smoking inside the vehicles. According to the state-owned Perusahaan Pengangkutan Djakarta (PPD), the bus company has placed stickers telling passengers not to smoke and spit inside the buses but the stickers have been widely ignored, even by the bus crews. The announcement purportedly may have been prompted by consumer activist demands that the government step up anti-smoking campaigns and strengthen sanctions against smokers. *See The Jakarta Post*, May 3, 1994; *Kyodo News Service*, May 3, 1994.

MALAYSIA

[36] National Smoking Ban Takes Effect

A national policy banning smoking in many public places went into effect May 16, according to press reports. The antismoking policy, part of The Control of Tobacco Product Regulations 1993, bans smoking in hospitals, clinics, theaters, amusement centers, public lifts, public vehicles and air-conditioned houses and restricts smoking in other public places to designated areas. The regulations also restrict tobacco sales to those 18 years of age and older, make tobacco suppliers responsible for insuring that the government health warning and the statement indicating permissible "tar" and nicotine levels per cigarette appear on the packaging and forbid direct advertising of tobacco products in the local media and publications. However, the government apparently has decided to give cigarette manufacturers until the end of 1994 to comply with those rules. The regulations call for fines between RM$50 and RM$5,000 and jail sentences for those found to be in violation of the new rules. *See The Times*, May 16, 1994; *New Straits Times*, May 15, 1994; The *New Straits Times*, May 14, 1994.

SINGAPORE

[37] Smoking to Be Banned in Private Workplaces

Press reports indicate the Health and Information Minister has announced a new law banning smoking in all air-conditioned private offices and factories to be in effect by the end of the year. The announcement was made during a speech launching the 1994 National Smoking Control Campaign. The new law has been described as an extension of the 1985 ban against smoking in government buildings.

Singapore officially announced the goal of becoming a smoke-free society in 1970, when the government banned mass-media cigarette advertising and smoking in cinemas, buses and elevators. Despite that professed goal and the subsequent prohibition of smoking in hospitals, air-conditioned restaurants, department stores and supermarkets, the number of private companies in Singapore with smoking restrictions is said to be comparatively low. That assessment is based on a survey conducted in 1991 by the Ministry of Health's Training and Health Education Department, which found that 59 percent of the 1,168 companies that responded to the survey had some sort of restriction. In comparison, a 1987 study of 500 United States companies quoted in the survey found that 85 percent of the companies had smoking restriction policies. *See Reuters*, May 17, 1994; *The Wall Street Journal*, May 18, 1994; *The Straits Times*, May 18, 1994.

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ETS-RELATED LITIGATION NOT INVOLVING THE TOBACCO INDUSTRY

[38] *Will v. Qantas Airways Limited* (Dust Diseases Tribunal, New South Wales) (filed 1994)

A 49-year-old woman who claims she was forced to sit in the smoking section on a Qantas flight between Sydney and Los Angeles has filed suit claiming harm from ETS exposure. The suit is believed to be the first ETS-related action to be brought before the NSW Dust Diseases Tribunal. An interlocutory hearing is currently scheduled for June 23, 1994, to determine the jurisdictional question of whether plaintiff's alleged injuries are the result of a "dust-related condition."

In her statement of claim, plaintiff Carolyn Will alleges that her requests of Qantas personnel to be seated in a nonsmoking section of the aircraft was denied even after she showed a medic alert pendant indicating she was asthmatic. As a result of being forced to sit in the smoking section during the flight, she claims she suffered "acute asthma and panic." She also claims she was "acutely distressed and feared for her life," that an in-flight doctor had to administer valium and oxygen to her intravenously, and that she suffered a loss of enjoyment and relaxation during her holiday in Los Angeles.

The suit alleges negligence and breach of contract on the part of Qantas and seeks unspecified damages and costs. Plaintiff is represented by Roland Everingham of Cashman & Partners in Sydney.

OTHER DEVELOPMENTS

AUSTRALIA

[39] Health Agency Withdraws From Sponsorship Agreement

The New South Wales Health Department has reportedly withdrawn from an AUS$66,000 sponsorship agreement with the North Sydney rugby league club following a dispute over whether anti-"passive smoking" signs could be displayed at the team's playing field. Martin Palin of the Quit campaign is quoted as stating that he was disappointed with the termination of the arrangement, as ETS and sport "don't mix." He indicated that the department would look at an alternative sponsorship deal or use the money to pay for an advertising campaign. The former president of the club, David Hill, apparently asserted that the tobacco industry's "bullying tactics" had forced the club into complying with the New South Wales Rugby League's promotion of its Winfield sponsorship. *See The Associated Press*, May 17, 18 and 19, 1994.

CANADA

[40] Ministry Funds Environmental Sensitivity Clinic

The Ministry of Health will provide $2.5 million in funding for Canada's first environmental illness research and clinical program, according to a press announcement issued by the ministry and the Toronto Women's College Hospital, where the program will be located. The ministry and the hospital, as well as the University of Toronto, which will administer the research, are partners in the Environmental Health Clinic project.

The scope of research on environmental sensitivity is said to include diagnosis, treatment and prevention, although the initial focus will be on clarifying the definition of the disorder and establishing guidelines for its diagnosis. Health Minister Ruth Grier is quoted as stating that "it is important that we improve the quality of care for people with these disorders. For too long we have neglected the effects of environmental factors on our health."

The project will be headed by Dr. Gail McKeown-Eyssen of the University's Department of Preventive Medicine and Biostatistics. She has conducted research on the role of environmental influences on health, including the epidemiology of multiple chemical sensitivity. The Health Ministry also has played a role in the study of multiple chemical sensitivity by funding a study involving the measurement instruments for the examination of the disorder. *See Canada NewsWire*, May 9, 1994.

[41] Revenue Agency Investigating Antismoking Group

Revenue Canada is reported to be auditing the Smoking and Health Action Foundation, the main funding source of the country's leading anti-tobacco

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lobby group, the Non-Smokers' Rights Association (NSRA), for the possible misuse of charitable funds. The executive director of both organizations, Garfield Mahood, is quoted as stating that Revenue Canada is being used by Liberal MP John Bryden, who requested the audit, "to silence critics of the government policy."

Mahood's group spearheaded the opposition to the federal Liberal government's decision earlier this year to reduce cigarette taxes, a move which Bryden told the press he strongly supported.

Bryden purportedly suggested the audit to make the point to his caucus that it "was financed by government and may not have a strong membership component." Bryden is quoted as stating that "there appeared to be a fine crossover between the two organizations. If the charity is directly helping a lobby group then it appears to be improper."

Bryden also told the press that the documents revealed that in 1993 the foundation incurred $780,000 in expenses, approximately $400,000 of which went for salaries. Mahood, who has long refused to reveal his salary, reportedly told one newspaper that he earns $85,800, as does David Sweanor, the group's widely quoted lawyer. *See The Ottawa Citizen, The Toronto Star,* and *The Toronto Sun,* May 19, 1994.

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APPENDIX A

The numbers assigned to the following article summaries correspond with the numbers assigned to the synopses of the articles in the text of this Report.

LUNG CANCER

[23] **"Childhood and Adolescent Passive Smoking and the Risk of Female Lung Cancer," F.-L. Wang, E.J. Love, N. Liu, and X.-D. Dai, *International Journal of Epidemiology* 23(2): 223-230, 1994**

"This study, using household exposure to tobacco smoke as an estimate of PS ['passive smoking'], attempted to clarify further the relationship between female lung cancer and PS, especially that during childhood. Data were collected in the city of Harbin, the People's Republic of China, during 1985-1987."

"The questionnaire included questions on demographic information, residential history, smoking history, and the indoor smoking habits of the regular family members, etc. Information on indoor smoking was collected for each residence in which the subject had lived for 3 or more years. In this way, information on PS during different periods was also obtained."

"In this study, PS was defined as 1 gram/day or more of indoor smoking, by any member of the family sharing the same living accommodation as the subject for 1 year or more; a gram/day is roughly equivalent to one cigarette or one pipe of tobacco per day. . . . To measure the cumulative effect of PS on the cancer risk, a passive smoking index (PSI) in grams of tobacco x years of smoking, was calculated."

"[T]he OR for female lung cancer associated with exposure to maternal smoking was 2.70 (95% CI: 1.39-5.30). In contrast, the difference between childhood exposure to paternal smoking was not statistically significant."

"Table 4 shows the OR for lung cancer when PS occurred for the following age groups: 0-6, 7-14, 15-22, 23-30 years and 31-69 years. It was indicated that the risk for lung cancer was highest in those exposed under the age of 7 years (OR 3.46, 95% CI: 1.80-6.65) and was also significant at ages 7-14 (OR 3.08, 95% CI: 1.62-5.57) and 15-22 (OR 3.10, 95% CI: 1.52-6.31). Analysis of lifetime exposure (PS occuring at any time) showed that the crude OR for lung cancer associated with lifetime exposure was 2.67 (95% CI: 0.90-8.88) which was close to the significant level."

"To examine and control the potential effect of active smoking on cancer risk, the OR for lung cancer were analysed by smoking status. It was shown that the OR in all exposure periods were close between smoking pairs and non-smoking pairs, except in the period aged 15-22 years. It is also noted that the OR in all five age groups of exposure among non-smoking pairs were similar to those among all 114 pairs."

"However, how to measure sidestream smoke exposure and its effect on health remains a key issue. Several studies took the husband's smoking status as an estimate of PS for wives but this is far from accurate for the following reasons: (1) other family members, such as married relatives, parents and children may be important sources of sidestream smoke; in some oriental countries such as China, this is particularly true, (2) husbands may smoke outside the home, thus exposure does not occur, (3) also, information about exposure before marriage is not available. It is reasonable to believe that if PS has an effect on lung cancer risk, the nature and extent of that risk during childhood differs from that during adulthood. In this study, household exposure to tobacco smoke, from husbands and other family members, was taken as an estimate of PS, and collected for each residence, from childhood to adulthood. . . . [H]ousehold exposure to other family members' smoke accounted for about one-third of total sidestream smoke during adulthood, which should be taken into account when estimating PS and its effect on health."

"It was suggested in this study that, if the relationship between PS and lung cancer is studied only for adult exposure or over lifetime, the health effects of exposure during childhood may be masked. As a result, the whole or real effects of PS, especially that of early life exposure, may be underestimated and may have even escaped our attention in a previous study. . . . [C]ollection of exposure information from early life to adulthood and analysis of data by age of exposure is warranted."

"It should be noted that the finding of a 'dose-response' tendency in the three youngest expo-

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sure groups in our study may be questioned, because some of the 'passive' smokers were also active smokers. Matching by smoking status over lifetime between the cases and controls can, to some extent, obviate this criticism."

"In our study, we included 59 cancer patients who ever smoked. In an attempt to limit the effect of smoking on the lung cancer risk, individual matching by smoking status over lifetime (current- or ex-smoker versus never smoked over lifetime) was adopted. So, the cases and controls were comparable with respect to smoking status over lifetime (ever smoked or never smoked). For those 59 smoking pairs, there were no significant differences between cases and controls for the age smoking began and for years of smoking. However, the number smoked each day for the cases was slightly higher than that for the controls. This difference might magnify the observed OR in this study but it is unlikely to distort the true relationship between PS, especially PS in early life, and the risk of female lung cancer observed in this study. Similarity of the OR in four out of five exposure periods amongst smokers and non-smokers suggests no interaction between passive and active smoking. Of note, the OR in all five age periods among non-smoking pairs were similar to those among all 114 pairs studied. These results again suggest that active smoking is less likely to have a strong effect, if any, on the observed association between lung cancer and household exposure to tobacco smoke in the present study."

"Nevertheless, the findings from this study provide further support to the observation that PS may increase the risk of subsequent lung cancer, especially PS during childhood. It is also suggested that assessment of PS should be done by different exposure periods."

Respiratory Diseases and Conditions - Children

[24] **"Prevalence of Asthma and Wheeze in Two Different Climatic Areas of Saudi Arabia," A. Bener, T.Q. Al-Jawadi, F. Ozkaragoz, and J.A.D. Anderson, *Indian Journal of Chest Disease and Allied Sciences* 35(1): 9-15, 1993**

"The aims of the present study were to determine the prevalence of bronchial asthma and wheezing among children aged 7-12 years in Dammam and Riyadh regions of Saudi Arabia and to identify important predictors of the illness in these two regions with different environmental and climatic conditions."

"Family history of asthma and rhinitis was significantly higher in children who wheezed than the normal subjects in both the regions. Two environmental factors were also identified which appeared to be common to both the regions. Paternal smoking was seen more commonly in wheezy children than normal subjects."

"We have recorded that in children aged 7-12 years wheeze occurs more frequently in Riyadh than in Dammam. . . . [T]he prevalence of history of wheeze, attack of breathlessness or tightness in chest, usually dry cough, diagnosis of asthma, allergic rhinitis and history of eczema was more common in children of Riyadh as compared to children staying in Dammam. We may conclude that environmental and climatic factors may have an important role in the occurrence of wheezing, dry cough, allergic rhinitis and eczema. The frequency of asthma, allergic rhinitis and eczema among parents reflects the same pattern as seen in children. These were more prevalent among parents of children of Riyadh than those of Dammam."

"The prevalence of bronchial asthma in various parts of the world seems to vary widely. A comparison of studies is usually difficult because of lack of standardization of methodologies and definition of asthma. The difference in prevalence may reflect differences in the prevalence of asthma and/or a difference in the diagnostic habits of medical practitioners. . . . Urbanization, an enormous increase in the numbers of motor vehicles and factories, changes in lifestyle and exposure to new allergens may be some of the factors contributing to increase in the prevalence of asthma."

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Source: https://www.industrydocuments.ucsf.edu/docs/gswl0000

[25] **"Home Environmental Risk Factors in Urban Minority Asthmatic Children," K. Huss, C.S. Rand, A.M. Butz, P.A. Eggleston, C. Murigande, L.C. Thompson, S. Schneider, K. Weeks, and F.J. Malveaux, *Annals of Allergy* 72: 173-177, 1994**

"Our purpose was to describe baseline patient and home characteristics of an African-American population from the ongoing, community interventions for minority children with asthma project study. These data were obtained from telephone interviews and will focus on parent-reported home environmental characteristics as risk factors for asthma."

"Two hundred eleven (54%) of the children lived in single-family detached or row houses and 181 (46%) in apartments. Two hundred twenty (56%) lived with a cigarette smoker. Of the smokers, 160 (73%) were the child's mother, 31 (14%) were the father, and 27 (13%) were grandparents. One hundred sixty-two of the smokers (74%) identified cigarette smoke as a trigger factor for the child's asthma."

"When asked what exposures started their child wheezing, 282 (72%) parents indicated cigarette smoke, 208 (53%) dust, 133 (34%) cats, 106 (27%) dogs, 50 (15%) roach exposure, and 31 (8%) birds. Eighty-three homes (21%) were reported to have pets. Of those with pets, 65 families (78%) had dogs, 56 (67%) had cats, and 44 (53%) had birds."

"We obtained baseline data from structured telephone interviews with primary home care-givers of the asthmatic children. These were mostly mothers."

"In general, there were no relationships between baseline characteristics of the home environments of these inner city asthmatic children and the frequency or severity of asthma. These asthmatic children do have evidence of poor asthma control, with 44% reporting two or more days per week of restricted activity and 62% reporting two or more episodes of nocturnal symptoms per week. Forty-four percent reported at least one emergency department visit in the last 6 months."

"Fifty-six percent of subjects reported passive cigarette smoke exposure in the home. Seventy-three percent of the household smokers were the childrens' [sic] mothers. Seventy-two percent of households reported smoke as a known trigger factor for the child's asthma. The current smoking rates [sic] reported in African-American males is 33% and in females 23%."

"We did not find an association between parental cigarette smoking and increased severity of asthma. . . . Our parents, aware of the relationship between smoking and asthma, may have avoided smoking around the children. Alternatively, interview measures for severity of asthma may have been too insensitive to pick up this relationship. Objective tests of pulmonary function were not done routinely and might have detected respiratory abnormalities."

"Parents did report that they noted a relationship between cigarette smoke exposure and wheezing in the children. Parents of severe asthmatics were significantly more likely to believe that cigarette smoke was an asthma trigger for their children than parents of mildly asthmatic children. The data suggest a need for smoking cessation programs directed toward smokers in the homes of asthmatic children to decrease the frequency and severity of acute asthma in this population. These were predominantly mothers but fathers and grandparents also contributed."

"Only 16% of households used mattress covers despite 53% reporting dust as an asthma trigger. We found those who had mattress covers on beds had significantly fewer emergency department visits during the past 6 months than those without covers. This may reflect benefits of mattress covers or covers are surrogate markers for better asthma care in general. Mattress covers have been shown to be effective barriers to escape of dust mite and cat allergens from mattresses."

"There may be barriers to inner city families' implementing environmental control measures. Families are often unable to afford mattress encasings, acaricides, vacuum cleaners, and dehumidifiers."

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ETS Exposure and Monitoring

[26] "Decreased Fetal Weights in Rats Exposed to Sidestream Cigarette Smoke," P. Rajini, J.A. Last, K.E. Pinkerton, A.G. Hendrickx, and H. Witschi, *Fundamental and Applied Toxicology* 22: 400-404, 1994

"It has been observed in women who actively smoke during pregnancy that the average weight of their babies is generally somewhat lower at birth, on average by about 2000 g, than it is in babies born to nonsmoking mothers."

"Recently we have systematically explored effects of cigarette sidestream smoke (SS) on the lung development of rats exposed to a controlled atmosphere of SS while *in utero* and during the first 100 days of the postnatal period. For the conduct of these experiments, we maintained a chamber concentration of 1 mg/m^3 of total respirable suspended particulate matter (TSP) produced by collecting reference cigarette SS. . . . We decided to examine whether exposure of rats to SS during pregnancy would adversely affect the average litter weight. In this paper we report that SS exposure produced signs of a small, but significant, intrauterine growth retardation."

"We exposed pregnant rats to SS generated from burning Kentucky 1RF4 reference cigarettes. In order to minimize stress and its potential adverse effects on gestation, a whole-body exposure system was used rather than keeping the rats in nose-only restraint tubes during smoke exposure. From our experiments we conclude that exposure of pregnant rats to SS at TSP of 1 mg/m^3 affects fetal development. The reduction in birth weight was comparatively small (7%) and not accompanied by a significant decrease in ossification. This suggests that exposure to SS under the present conditions produced small but significant intrauterine growth retardation."

"The chamber atmosphere in our experiments was in all likelihood less concentrated than in most previous experiments in which pregnant rats were exposed to cigarette smoke. A concentration of 1 mg/m^3 of TSP is roughly 10 times higher than what can be measured on average when there is indoor smoking, where concentrations as high as 300 ug/m^3 occur only rarely. Likewise, common public exposure to nicotine is on the average 10 ug/m^3, although under higher exposure conditions it may increase up to 10 times this value. On the other hand, exposure to CO in our experiments is comparable to the average public exposure of 4-5 ppm in restaurants and 2-3 ppm in the workplace."

"What mechanisms might account for our observation of intrauterine growth retardation in fetuses of rats whose dams were exposed to SS? The precise underlying mechanisms of the harmful fetal effects related to maternal smoking (exposure of the fetus to mainstream cigarette smoke or its products) during pregnancy are controversial. Suggested mechanisms of action, which could also explain the effects observed in this study with SS, include nicotine-induced vasoconstriction, resulting in a chronic reduction in placental blood flow, and fetal hypoxia due to CO in smoke."

[27] "Short-Term Effects of Sidestream Smoke on Respiratory Epithelium in Mice: Cell Kinetics," P. Rajini and H. Witschi, *Fundamental and Applied Toxicology* 22: 405-410, 1994

"[T]he health effects of nw tobacco smoke (ETS), a major pollutant of indoor atmospheres, are defined with less certainty."

"[D]ifferences exist between the chemical composition of MS generated by puffing cigarettes compared to SS emanating from the glowing tip of a cigarette. This warrants a more detailed analysis of the effects of SS on biological systems, including whole animals."

"The effects of SS on the respiratory tract of laboratory animals have been investigated in only a few studies. . . . In this paper we present an analysis of cell proliferation in the airways and pulmonary parenchyma of mice exposed to SS at a concentration of 1 mg/m^3 of total suspended particulate matter."

"There is little information available on the early alterations in the respiratory epithelium of animals exposed to SS. In the present study the effects of inhaled SS were examined in two mouse strains that, according to a recent study, differ in their inherent sensitivity to potentially carcinogenic chemicals and with regard to basal cell turnover in the lung parenchyma. Strain A/J mice readily develop spontaneous or chemically induced pulmonary adenomas and have a higher proliferative rate in their type II alveolar cell

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population than have C57BL/6 mice, which are also resistant to tumor induction. We found an increase in cell proliferation in the large intrapulmonary airways and in the terminal bronchioles of A/J mice exposed for 3 and 5 days to unfiltered smoke at a particulate concentration of 1 mg/m^3. No other signs of SS smoke-induced changes were observed in the epithelium lining the intrapulmonary airways or in the pulmonary parenchyma. In this respect our observations resemble those of Coggins et al. who found no pathological alterations in the respiratory epithelium of rats other than reversible epithelial hyperplasia in the nasoturbinates at a concentration of 10 mg/m^3 particulates, after a 14-day exposure. In rats exposed to 1 or 0.1 mg/m^3 particulates, no histopathological changes were detected. . . . [O]ur study demonstrates that SS at a concentration of 1 mg/m^3 and inhaled for 3 or 5 days can elicit definite proliferative changes in the airways of strain A/J mice. However, the response was restricted to this particular mouse strain. We did not observe any alterations in the proliferative pattern in the airways of the C57BL/6 mice."

"A proliferative response to SS was only found in the airways of A/J mice exposed to unfiltered tobacco smoke, indicating that the biological activity eliciting this particular response resides with the particulate phase. . . . For the moment, we do not have an explanation for the differential response of the two mouse strains except to speculate that there exists a genetic difference between the two strains in their proliferative response to inhaled gases and particulate material."

"In conclusion, the results presented here show an effect in mice exposed to concentrations of SS that have been called 'extreme' when compared to measurements made in the 'real world' of smoke-filled restaurants or offices where respirable suspended particulate matter, determined gravimetrically, has been found to be around 0.12 mg/m^3. The positive response observed in this study once more draws attention to the often considerable difference between mouse strains in the response to the same toxic inhalant. Furthermore, gravimetrically measured particulate concentrations of 1 mg/m^3 were used in other studies that examined the effects of SS on the respiratory tract of rats. No histopathological changes were noted. Such observable effect levels may not only reflect potential species sensitive, but also the sensitivity of the analytical methods that are used."

INDOOR AIR QUALITY

[29] "Nitrogen Dioxide Exposures Inside Ice Skating Rinks," M. Bruner and J.D. Spengler, *American Journal of Public Health* 84(3): 429-433, 1994

"In skating rinks, the operation of gasoline- or propane-powered equipment to clean and resurface the ice can lead to elevated concentrations of combustion products."

"[W]e sought to examine the potential public health impact of repeated exposures to nitrogen dioxide by investigating the range of concentrations encountered in skating rinks under normal operating conditions. We hypothesized that ice rinks presented the major nitrogen dioxide exposure of users and that, based on comparisons with epidemiological studies of indoor exposures, levels of nitrogen dioxide encountered in ice rinks warrant concern."

"To estimate the importance of nitrogen dioxide exposures in ice rinks, we compared our measurements with those from other environments. Typical ambient nitrogen dioxide concentrations in urban areas are below 50 ppb, with infrequent hourly values above 200 ppb. Indoor concentrations are often much higher than ambient values, particularly in homes with unvented gas appliances. Since more than 40% of US homes contain gas appliances, the problem of elevated indoor nitrogen dioxide is more widespread. Extensive (2-week average) measurements in Boston homes with gas stoves report median concentrations of 20 to 40 ppb, depending on the season of the measurement and the location in the home where the measurement was collected. . . . During cooking, peak nitrogen dioxide concentrations of 450 ppb (1-hour average) are sustained for 1 to 2 hours. This scenario of short-duration intermittent exposures is similar to the 1- to 3-hour exposures experienced by spectators and skaters in ice rinks; rink employees as well as coaches and figure skaters are likely to be exposed for longer periods (4 to 8 hours). Skaters are probably the most susceptible to health effects of air pollutants in an ice skating rink since ventilation rates while skating are expected to exceed normal resting breathing rates by three to five times."

"[W]e estimate that 1-hour nitrogen dioxide concentrations would be two to five times the measured

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1-week average. Assuming that the parameters assessed in our survey are typical of the more than 200 ice rinks in operation in the United States and Canada, a rink is staffed by employees for 14 hours and visited by 300 people (for 1 to 2 hours) daily. Therefore, 500,000 or more individuals per day may be exposed to concentrations of nitrogen dioxide that are well above the highest measured ambient and indoor levels."

"From a regulatory standpoint, then, it is most important to eliminate incidents through corrective action and to set air quality standards for normal operating conditions at levels well below those that lead to measurable acute effects."

"Although policy for indoor air quality has not yet been developed by the US government, short-term guidelines (1-hour average) of 200 ppb and 250 ppb nitrogen dioxide have been published for residential indoor air by the World Health Organization (WHO) and the department of National Health and Welfare Canada, respectively. These guidelines are designed to protect sensitive members of the population (such as asthmatics) with an adequate margin of safety. Although these guidelines are more pertinent to ice rinks than are ambient air standards, they were developed primarily for residential environments and therefore have only limited applicability for indoor ice arenas. Moreover, because skaters are often young children, occupational standards based on a healthy adult worker are not appropriate."

"Figure 1 indicates that at least 60% of the rinks included in this survey would exceed the 1-hour WHO limit of 200 ppb or the Canadian guideline of 250 ppb. In fact, it may be premature to emphasize an air quality standard for ice rinks when so many rinks are likely to be out of compliance. Instead, efforts should be directed toward education, design, and operational changes in order to mitigate the impact of resurfacers on air quality."

"Strategies to maintain 1-hour nitrogen dioxide and carbon monoxide concentrations below 250 ppb and 35 ppm, respectively, are recommended. . . . With hourly resurfacings, a typical rink building of 22,000-m^3 volume would require nearly one air exchange per hour or 13,000 cu ft of ventilation air per minute."

"Depending on the location of the rink, additional heating of the ventilation air may be required. . . . For example, a gas-fueled heater with a heat exchanger at a fuel price of $0.005/cu ft would cost $6000 to $8000 annually to operate. For the approximately 50% of rinks that operate for the entire year, providing chilled dehumidified air in the summer could more than double these energy costs. Since our survey found that 10% of the enclosed rinks do not even have a ventilation system, certain rinks would also need to incur large capital costs to achieve desirable air quality."

"An alternative approach is to replace existing gasoline- or propane-fueled resurfacers with electrically powered units."

[30] **"Air Recirculation and Sick Building Syndrome: A Blinded Crossover Trial," J.J.K. Jaakkola, P. Tuomaala, and O. Seppanen,** ***American Journal of Public Health*** **84(3): 422-428, 1994**

"We carried out a blinded, four-period crossover trial to test the hypothesis that the use of recirculated air in mechanically ventilated office buildings with sufficient intake of outdoor air (exceeding the regulatory recommendations) and without any unusual internal sources of indoor air pollution causes mucosal irrigation, skin reactions, allergic reactions, and general symptoms (commonly known collectively as the sick building syndrome), as well as perceptions of unpleasant odor, stuffiness, or dustiness."

"Two identical office buildings in Kilo, 15 km from the center of Helsinki, were selected as suitable for our study. Constructed in 1974, these buildings have eight stories and are 72 m long, 18 m wide, and 35 000 m^3 in volume. The structure of each is concrete, and the windows can be opened. Each building has a central mechanical ventilation system, hot water radiators for heating, and two identical air handling units, which are operated only during office hours, from 7 AM to 5 PM. The proportion of return air, ordinarily 30% to 40% during the heating season, is selected by adjusting the blades of the dampers."

"From the source population -- the 470 workers in the two buildings -- all those who met the following eligibility criteria were targeted for recruitment to the study population: (1) experience, during the previous 12 months, of symptoms and/or perceptions of poor indoor air quality, which were attributed to the work

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environment generally or to the indoor air quality specifically; (2) work in an assigned room on the average of at least 3 days a week; (3) no anticipated absence from work during the study period owing to vacation, trip or other reason; (4) no doctor-diagnosed asthma; and (5) no regular exposure to environmental tobacco smoke in the office."

"For the week just before the experiment, both buildings were ventilated without recirculation, with a total airflow of 20 liters per second (L/s) per person. During the first experimental week, based on random selection, one building (building A) was operated with 70% recirculation while no recirculation was used in the other building (building B). The operation of the recirculation system was then switched during the weekend so that this procedure was reversed during the second week. A similar crossover procedure was carried out two more times. Thus, each participant experienced two periods of exposure to recirculated air (index periods, index phase) and two periods of no exposure (reference periods, reference phase)."

"The total supply airflow was kept constant at 20 L/s per person through the experiment."

"The mean differences in the symptom scores did not differ from zero more than could be expected by chance."

"The number of subjects with more problems during the use of recirculated air did not differ significantly from the number of those with fewer problems, either in the total study population or in those with corresponding symptoms/perceptions during the previous 12 months."

"There were slightly more subjects with symptoms of the common cold during the reference period than during the index period (20 vs 23). The participants spent, on average, 8 minutes per day less in the office during the index phase than during the reference phase. Similarly, there were slight differences in smoking in the office, perception of tobacco odor, and opening of the windows during the two periods."

"The sick building syndrome has not been defined properly as a scientific concept, and so far no unifying mechanism has been postulated. We attempted to define the outcome criteria conceptually as biological reactions, mucosal irritation, and allergic reactions. We described the reactions operationally by the chosen symptom scores.

"The study population of 75 office workers was recruited from a source population of 470 office workers because they indicated having symptoms or perceived poor air quality related to the work environment at baseline. These subjects thus represented the most sensitive workers, those in whom the effect was most likely to be manifest."

"The amount of outdoor airflow is directly related to the capability of removing indoor air pollution from a given space. Keeping the total supply airflow constant and varying the proportion of recirculated air, as we did in our study, corresponds to the real-life situation. Our design purpose was to keep room temperature, relative humidity, and total supply airflow similar during the index and reference periods. However, the use of air recirculation had some minor effects on other indoor air factors: the room temperature increased, on average, by 0.4_C; the relative humidity increased by 1%; and the supply air intake rate decreased by 3 L/s per person."

"The use of 70% recirculated air in the context of sufficient intake of outdoor air appeared not to increase mucosal irritation, skin or allergic reactions, or general symptoms, nor to increase the reporting of poor air quality. Thus, the findings of this study detract from the theory that change in the physical character of air due to recirculation (homogenization) causes the symptoms of the sick building syndrome."

"Our results provided evidence that 70% recirculated air, when accompanied by an adequate intake of outdoor air, can be used without causing adverse effects."

[31] "Editorial: Building Ventilation and Symptoms -- Where Do We Go from Here?" M.J. Mendell and L. Fine, *American Journal of Public Health* 84(3): 346-348, 1994

"In the past 2 decades, increasingly frequent episodes of symptoms (e.g., headache; lethargy; eye, nose, and throat irritation; breathing difficulties; and dry skin) among occupants of large, mechanically ventilated buildings have aroused public concern."

"The role of building ventilation in this phenomenon is not well understood. Inadequate ventilation is a suspect in many symptom episodes, yet this suspicion is based on little actual knowledge about the relation-

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ship between ventilation and health. The study by Jaakkola et al. reported in this issue exemplifies one kind of research necessary to provide this knowledge; however, consideration of the few relevant studies available illustrates how far we still have to go."

"In theory, a building should then actually provide and continue to provide the prescribed amount of outdoor air, but in practice, building codes have not been used for this kind of enforcement. In effect, practically enforceable standards for the delivery of outside air into occupied buildings have been rare. Only recently have proposed or established indoor air quality statutes in several states (e.g., California, New Jersey, and Washington) defined such explicit standards for outdoor ventilation."

"Aside from the aforementioned study by Jaakkola et al., at least five reported experimental or cross-sectional studies (reviewed elsewhere) have assessed the relationships between occupant symptoms and outside air ventilation rates in large buildings, including outside air ventilation levels ranging from well below current minimum guidelines to well above. All previously reported comparisons in which both mean ventilation rates were *above 21 cfm/p* (or 10 L/s per person) found no significant symptom differences between ventilation rates. All previously reported comparisons in which one or both of the mean ventilation rates compared were *at or below 21 cfm/p* found significantly increased symptom prevalence at the lower ventilation rate. Jaakkola et al., however, here report no significant differences in symptom prevalence between ventilation rates of 13 and 42 cfm/p of outside air."

"The discrepancy between Jaakkola et al. and other studies is not the result of any evident design weaknesses in the current study: Jaakkola et al.'s study involved a double-blind experiment, using a multiple crossover design and within-subject analyses to control for individual confounding factors and time effects, and a daily symptom diary to minimize recall bias. One possible reason for the discrepancy may be the brief 1-week experimental periods used in this study, which would allow detection only of immediate effects."

"Ultimately, assessment of the relationship between ventilation and health must recognize that any health effects of a low outdoor air ventilation rate would occur only because outdoor air dilutes and reduces the concentrations of indoor-generated contaminants. Indoor exposures of concern -- including odors, chemical toxins, allergens, and infectious agents -- come from both human and nonhuman sources, such as building materials, furnishings, cleaning products, and microbiological contaminants. Generally, the stronger or more toxic an indoor source, the more dilution required to reduce its indoor concentration to acceptable levels."

"Since we do not yet understand the nature, distribution, or toxicity of the many sources of indoor exposures, we have a limited scientific basis for considering current buildingwide outdoor air ventilation guidelines to be health protective. Given the impracticality of collecting toxicity information on all indoor pollutants of concern (including odorants, toxicants, allergens, and infectious agents), empirical data on worker symptoms at different outdoor air ventilation rates may be useful in setting guidelines that will reduce occupant symptoms in most buildings."

"Jaakkola and others have demonstrated the utility of scientific research for this purpose, but available studies are too limited for conclusions."

"Research on office worker symptoms must also consider more than outdoor air ventilation, because even buildings with high levels of outdoor air ventilation can have large proportions of workers with nonspecific symptoms. These symptoms are clearly of multifactorial origin: epidemiologic studies have found their substantial occurrence in every large building studied and associated with a variety of building, workspace, job, and personal/psychological factors. Examples of implicated factors include air-conditioning systems, temperature, humidity, carpets, poor office cleaning, work stress, and female gender. Increasing the ventilation per person may help reduce symptoms caused by indoor-generated pollutants (although pollutant source reduction would be clearly preferable); however, increased ventilation would *not* eliminate symptoms related to psychological stressors, temperature or humidity, outdoor air contaminants, or contaminants produced within ventilation systems."

"Existing scientific findings suggest that standards for outdoor air ventilation rates in occupied buildings may be reasonable, particularly if bolstered by additional research. But as ventilation standards alone cannot be

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sufficient to guarantee adequate indoor air quality, we must look beyond minimum ventilation requirements to consider the proper design, construction, operation, and maintenance of buildings and their ventilation systems. More research is necessary here as well; however, based on current knowledge, the US Environmental Protection Agency and the National Institute for Occupational Safety and Health have compiled some practical approaches to the prevention and resolution of health and comfort concerns related to indoor environmental quality."

"We should not ignore these health problems of office workers simply because they involve nonspecific symptoms and multifactorial causes and because we have generally failed to identify simple solutions. Even nonspecific symptoms and multifactorial causes and because we have generally failed to identify simple solutions. Even nonspecific symptoms, when commonly experienced in the large population of indoor workers, are of public health importance and are probably of economic importance as well. We will be able to minimize these symptoms only when we more fully understand the requirements for truly healthy indoor environments."

[32] **"Tobacco Smoking Policy and Indoor Air Quality: A Case Study," M.A. Jadud and B.A. Rock, *Energy and Buildings* 20: 143-150, 1993**

"Due to a recent US governmental agency ruling, one indoor pollutant source, environmental tobacco smoke (ETS), is attracting the attention of building owners, operators, and users. These individuals face the challenge of balancing the need for a healthy, productive indoor environment versus the rights and desires of smokers and nonsmokers. Policymakers face the difficult tasks of creating and maintaining this balance which should be created through careful evaluation of health, technical, social, and business issues. This paper presents some of these issues and addresses them in a case study of a smoking area in an institutional building."

"While the US EPA has published this major assessment on the respiratory health risks of secondhand smoke, the EPA does not have any regulatory authority for controlling ETS in the workplace."

"Environmental tobacco smoke is commonly perceived as the cause of health ailments because smoke is one of the few indoor pollutants that occupants can see or smell. ETS is blamed for sore throats, burning eyes, coughing, headaches, and a variety of related respiratory ailments. Yet, in studies done by the US National Institute for Occupational Health and Safety (NIOSH), only 2% of the environmental complaints were ultimately attributed to ETS. An argument can be made that ETS is not a cause of sick buildings, but its accumulation in a building is a symptom of a poor ventilation system. If smoke can build up within a room, other contaminants such as carbon monoxide and formaldehyde can as well. When examining the health problems and complaints of building occupants, both ventilation and pollutant generation should be examined."

"One option proposed for the control of tobacco smoke is the use of common courtesy. A suggestion by tobacco users is that nonsmokers should tell tobacco users if they are annoyed by the smoke. They propose that if asked pleasantly, smokers will not use their tobacco indoors. Survey data taken between 1974 and 1987 reveal that this approach is used approximately 5% of the time. The data show that most nonsmokers feel uncomfortable asking a person not to smoke and that 40-50% of the people are much more likely to move away from the smoking area. This method, however, does not adequately address the issue of secondhand smoke and its liabilities. Building occupants who do not complain or move away would still be exposed to airborne combustion products."

"Separating nonsmokers from smokers has been a popular method in US restaurants for fulfilling the desires of their customers. Segregation of workers often is not practical due to the need for interaction and efficient use of business resources. When segregation does occur, such as in restaurants, typically some or all of the air from both spaces recirculates through a common air distribution system. In this situation, the secondhand smoke issue has not been addressed. Without complete isolation, other occupants of an otherwise segregated environment will be exposed to pollutants created by tobacco smoking."

"One method to avoid the problems of secondhand smoke is the adoption of a policy that completely bans smoking indoors. The removal of an indoor air pollutant, such as ETS, at its source is a good method for control, but may not be the optimal solution. This

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method might not involve any operational or maintenance costs and is becoming popular in the US. However, smoking bans may have drawbacks. A ban only removes the specific source in question and does not address the accumulation of other toxic substances in the indoor environment. If tobacco smoke can accumulate in a building due to a poor ventilation system, so can other substances. Also, the productivity of smokers may be reduced because of increased work breaks. Smoking areas with urns must be established outside, preferably covered and away from entrances and circulation paths of other workers. Smoking, and other sources of pollutants, must not be allowed near outdoor air intakes of buildings."

"Another approach suggested by the tobacco industry and others to control tobacco smoke is the development of dedicated smoking lounges. This method of ETS control would typically include a general smoking ban in a building, but indoor smoking lounges with separate ventilation systems are provided to accommodate tobacco users. Use of this approach may maintain productivity and eliminate undesired exposure to secondhand smoke."

"In this research project, an existing smoking area was sought to examine ETS. A small snack bar with a smoking area that is within an institutional building was selected. . . . The designated smoking area is bordered on three sides by other interior rooms of the buildings. There is one exterior wall to the smoking area. A highly used hallway passes through the smoking area. Moveable benches and ashtrays are located around the perimeter of the space. Frequently, long lines of customers form while waiting to purchase items at the snack bar. Doors are located between an adjoining art gallery and the smoking area, but these doors are generally left open. Magnetically operated fire doors in the hallway are usually open and are occasionally obstructed by ashtrays or benches."

"During this study, there were several interesting observations of nonsmoker behavior. Often nonsmokers who entered the space after smokers had left moved the ashtrays several feet from where they had chosen to sit. This action reveals an often overlooked side-effect of tobacco smokers; cigarettes can continue to burn after the smoker has left. All of the smoke released from tobacco burning in this manner is sidestream smoke."

"Discussions with the facilities operation staff revealed that this building has had many complaints about air-conditioning and ventilation."

"Many undocumented changes have been performed on the building through the years in attempts to improve the ventilation system. However, complaints about the air quality continue, and tobacco smoke visibly spreads throughout the building from the smoking area. Based on the frequent complaints, the observed failure of the ventilation system to clear the tobacco smoke, and the low supply air design values, this appears to be a 'sick building'."

"In this project, engineering and policy solutions were sought that could correct this indoor air quality problem. . . . Because the existing air-conditioning system within the building is unable to serve the space in a adequate manner, it cannot deliver the extra volume needed to comply with this standard [ASHRAE 62-1989]. Instead, the creation of a separate smoking lounge was considered."

"One solution to this indoor air quality problem is to construct a smoking lounge on the east-most (exterior) portion of the snack bar area as shown. . . . A glass curtain wall can be built to separate the smoking and nonsmoking sections. This wall will let natural light into the interior nonsmoking space and create a 16 m^2 (176 ft^2) smoking lounge between it and the exterior wall. Following the ASHRAE guideline of 70 people per 100 m^2 (1000 ft^2), this space can serve about 12 smokers."

"The ventilation air requirements for this space would be provided from a combination of the existing air-conditioning system and transfer air from the nonsmoking section."

"All of the smoking lounge supply air would be exhausted outside in a way to produce a negative pressure relative to the surrounding spaces."

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SMOKING POLICIES AND RELATED ISSUES

[33] **"Stratification and Smoking: A Search for Class-Based Smoking Lifestyles," J. Goldstein, *Journal of Drug Education* 23(4): 357-373, 1993**

"This study looked for evidence of distinctive smoking lifestyles among social classes. Data on smoking attitudes and behaviors were collected via interviews of a representative sample of residents of a major western Canadian city. Four indicators of social class position (based on two approaches to conceptualizing social class) were employed."

"Passive smoking was viewed as harmful to nonsmokers by 87 percent of all respondents. . . . [T]here were no significant differences between any classes on this item. There was slightly less agreement about the harmfulness of passive smoking than there was about the dangers of passive [sic] smoking. That such a difference existed probably reflects the fact that the hazards of active smoking have been publicized for more than two decades, while dissemination of information about the risks of passive smoking is a relatively recent development."

"Opinions on banning public smoking were divided. Roughly one-half (49%) of all respondents disagreed or strongly disagreed with such a policy, while about one-third (34%) agreed or strongly agreed. Analysis of variance revealed that there were no significant differences between the mean scores of classes (regardless of the indicator used) on this issue."

"Slightly over one-half (52%) of the sample agreed that it was annoying to be near someone who is smoking, while one-third (33%) held the opposite opinion. . . . [T]here were no significant differences between classes on this item."

"A pivotal factor affecting antismoking attitudes was the respondent's own smoking behavior. Current smokers tended to disagree with both antismoking attitude items, while nonsmokers tended to agree with them. These differences between smokers and nonsmokers were statistically significant."

"Roughly one-quarter (24%) of the respondents said that there was some type of restriction on smoking in their residence. Restrictions took various forms, including a total prohibition of smoking, prohibiting minors from smoking, allowing smoking only in a specific room, forbidding smoking when children are at home, etc. In all classes (regardless of the indicator used), smoking restrictions were present in a distinct minority of households. There were no significant differences between classes in the percentage of households with smoking restrictions. University graduates were nearly twice as likely as those who had not finished high school (31% versus 17%, respectively) to report residential smoking restrictions. However, for the full range of education-based classes, the observed differences in this antismoking behavior were not statistically significant."

"The study sought evidence of distinctive smoking lifestyles among social classes in a major Canadian city. The possibility that such lifestyles might exist was suggested by research which has found an inverse relationship between smoking prevalence and social class. Despite the use of a methodology which maximized the chances of uncovering differences between classes in smoking attitudes or behaviors, very few significant differences were found."

"The conclusion that emerges from this research is that a nonsmoking lifestyle which cut across differences in educational attainment, occupational status, income, and ownership of the means of production existed in the community surveyed. In absolute terms, it was found that: a majority of members of all classes were nonsmokers; there was a strong agreement among all classes that both active and passive smoking are hazardous to health; a majority of members of all classes reported having encouraged someone to quit smoking; an unfavorable stereotype of cigarette smokers was common to all classes; and smokers in all classes tended to express a willingness to try to quit."

"The nonsmoking lifestyle which characterized the sample suggests that the multifaceted approach to smoking prevention which has been implemented in Canada has been effective."

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APPENDIX B

UPCOMING SCIENTIFIC MEETINGS

• **May 30-June 3, 1994**
Conference on Microfungi and Their Role in IAQ, Ottawa, Canada [Issue 68, Item 24]

• **June 17, 1994**
Indoor Air Quality: An Overview for People Who Need to Know, AIHHM, Oklahoma City, Oklahoma [Issue 57, Item 35] Same program to be held July 14, 1994, Anchorage, Alaska

• **August 22-25, 1994**
Healthy Buildings '94, Budapest, Hungary [Issue 63, Item 26]

• **September 7, 1994**
One-Day IAQ Course, Environmental Law and Policy Program, George Washington University, Washington, D.C. [Issue 63, Item 25]

• **October 6-8, 1994**
Healthy Indoor Air '94, Anacapri, Italy [Issue 68, Item 25]

• **October 10-14, 1994**
9th World Conference on Tobacco and Health, Paris, France [Issue 60, Item 38]

• **October 18-20, 1994**
Indoor Air Quality in Asia, Beijing, China [Issue 54, Item 42]

• **October 30-November 2, 1994**
IAQ '94: Engineering Indoor Environments, ASHRAE and other sponsors, St. Louis, Missouri [Issue 58, Item 42]

• **November 27-December 1, 1994**
Indoor Air: An Integrated Approach, EPA and other sponsors, Gold Coast, Australia [Issue 72]

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